Section 4

Changes in Communities

Objective

After completing this lesson, students will be able to

E.1.4.1 Describe the differences between primary and secondary succession.

Target Reading Skill

Comparing and Contrasting Explain that comparing and contrasting shows how ideas, facts, and events are similar and different. The results of the comparison can have importance.

Answers

Possible answers:

Primary Succession—volcanic eruption, no soil or organisms exist, no

Secondary Succession—fire, soil and organisms exist but have been disturbed, yes

All in One Teaching Resources

- Transparency E8

Preteach

Build Background Knowledge

L2

Changes Over Time

Ask: **Have you ever observed a vacant lot or an untended garden over time? What changes did you see?** *(Answers will depend on students' experiences. They probably will say that first small grassy weeds grew, then larger weeds and some shrubs, and finally small trees.)*

Section 4

Changes in Communities

Reading Preview

Key Concept

- How do primary and secondary succession differ?

Key Terms

- succession
- primary succession
- pioneer species
- secondary succession

Target Reading Skill

Comparing and Contrasting As you read, compare and contrast primary and secondary succession by completing a table like the one below.

Factors in Succession	Primary Succession	Secondary Succession
Possible cause	Volcanic eruption	
Type of area		
Existing ecosystem?		

Lab zone Discover Activity

What Happened Here?

1. The two photographs at the bottom of this page show the same area in Yellowstone National Park in Wyoming. The photograph on the left was taken soon after a major fire. The photograph on the right was taken a few years later. Observe the photographs carefully.
2. Make a list of all the differences you notice between the two scenes.

Think It Over

Posing Questions How would you describe what happened during the time between the two photographs? What questions do you have about this process?

In 1988, huge fires raged through the forests of Yellowstone National Park. The fires were so hot that they jumped from tree to tree without burning along the ground. Huge trees burst into flame from the intense heat. It took months for the fires to burn themselves out. All that remained were thousands of blackened tree trunks sticking out of the ground like charred toothpicks.

Could a forest community recover from such disastrous fires? It might seem unlikely. But within just a few months, signs of life had returned. First, tiny green shoots of new grass poked through the sooty ground. Then, small tree seedlings began to grow. The forest was coming back! After 15 years, young forests were flourishing in many areas.

Fires, floods, volcanoes, hurricanes, and other natural disasters can change communities very quickly. But even without disasters, communities change. The series of predictable changes that occur in a community over time is called **succession.**

Changes in a Yellowstone community ▼

Lab zone Discover Activity

Skills Focus Posing questions

Materials none

Time 10 minutes

Expected Outcome In Photograph A the soil is bare and scorched; trees in the background have been damaged. In Photograph B the soil is covered with small plants and the damaged trees are leafy.

L1

Think It Over Small plants began to grow again; the existing trees recovered. Students' questions will vary. Sample questions: What kinds of plants come back first? Will the area ever look like it did before the fire? How long will that take?

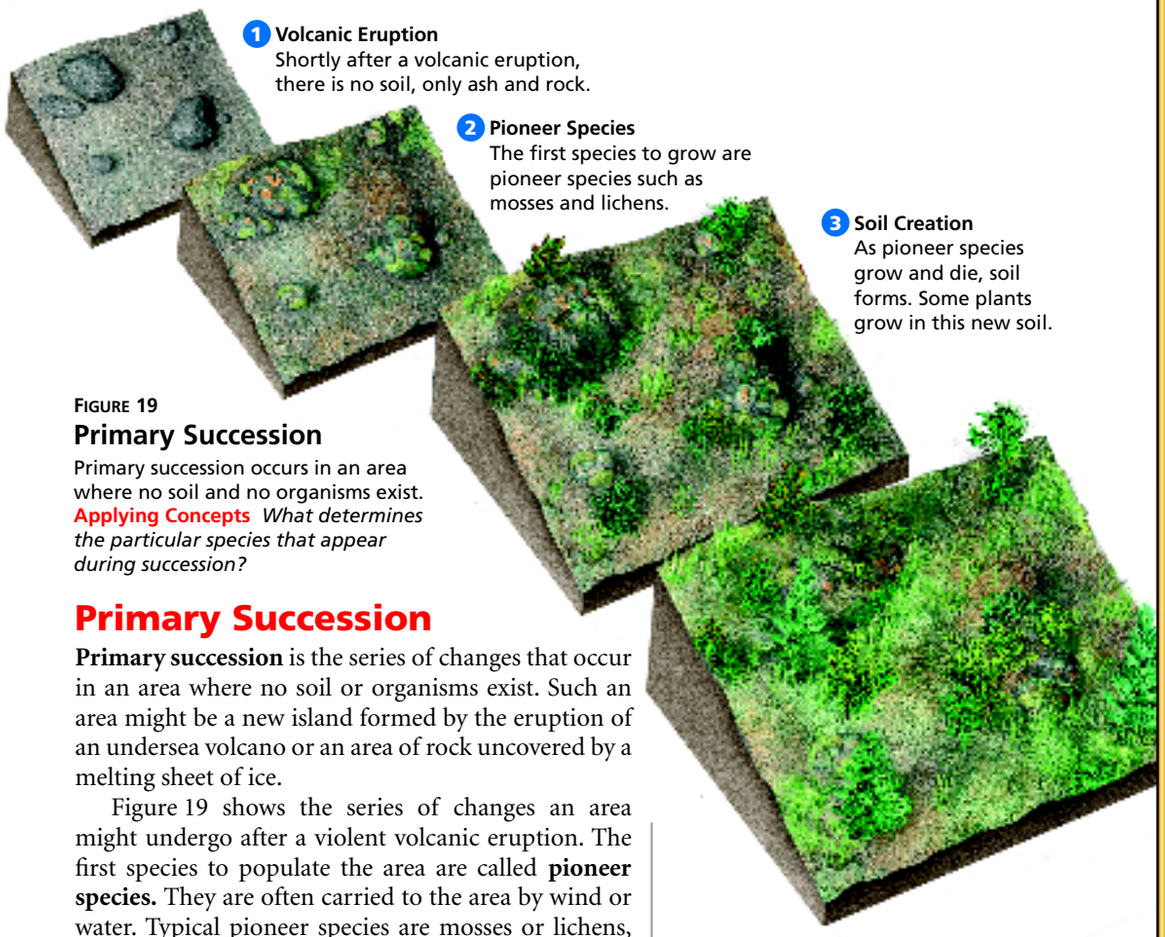

FIGURE 19
Primary Succession
Primary succession occurs in an area where no soil and no organisms exist. **Applying Concepts** *What determines the particular species that appear during succession?*

Primary Succession

Primary succession is the series of changes that occur in an area where no soil or organisms exist. Such an area might be a new island formed by the eruption of an undersea volcano or an area of rock uncovered by a melting sheet of ice.

Figure 19 shows the series of changes an area might undergo after a violent volcanic eruption. The first species to populate the area are called **pioneer species.** They are often carried to the area by wind or water. Typical pioneer species are mosses or lichens, which are fungi and algae growing in a symbiotic relationship. As pioneer species grow, they help break up the rocks. When the organisms die, they provide nutrients that enrich the thin layer of soil that is forming on the rocks.

Over time, plant seeds land in the new soil and begin to grow. The specific plants that grow depend on the climate of the area. For example, in a cool, northern area, early seedlings might include alder and cottonwood trees. Eventually, succession may lead to a community of organisms that does not change unless the ecosystem is disturbed. Reaching this mature community can take centuries.

Reading Checkpoint **What are some pioneer species?**

Instruct

Primary Succession

Teach Key Concepts L2

Predicting Changes

Focus Remind students that the events that occur during succession are predictable.

Teach Ask: **Which stage of succession in figure 19 shows pioneer species?** *(Second stage)* **How might these species arrive at the area?** *(They could be carried by wind or water.)*

Apply Ask: **Why are the changes during succession predictable? How can ecologists tell what will happen in a particular community after a natural disaster?** *(The types of plants that will grow in the area and the types of animals that will live there are determined by climate conditions, which usually are not changed over the long term by a disaster. Certain organisms appear first because they can survive in those conditions. Other species appear later as conditions become suitable for their survival.)* **learning modality: logical/mathematical**

All in One Teaching Resources

- Transparency E9

Monitor Progress L2

Answers

Figure 19 The particular species depend on the biome of the area.

Reading Checkpoint Lichens and mosses

Secondary Succession

Teach Key Concepts L2

Comparing Primary and Secondary Succession

Focus Remind students that primary succession occurs in an area where no soil or organisms exist.

Teach Have students study Figure 20. Ask: **How does secondary succession differ from primary succession?** *(Secondary succession occurs in an area where the ecosystem has been disturbed but soil and organisms still exist.)* **Which type of succession usually occurs more rapidly?** *(Secondary succession)*

Apply Ask: **What type of succession would occur in an area that has been damaged by floods? Explain your answer.** *(Secondary succession because most likely soil and other organisms will remain after the flood)* **learning modality: logical/mathematical**

All in One Teaching Resources

- Transparency E10

Go Online NSTA SCILINKS
For: Links on succession
Visit: www.SciLinks.org
Web Code: scn-0514

Download a worksheet that will guide students' review of Internet sources on succession.

1 Abandoned Field
Grasses and wildflowers have taken over this abandoned field.

2 Tree Growth Begins
After a few years, pine seedlings and other plants replace some of the grasses and wildflowers.

FIGURE 20
Secondary Succession
Secondary succession occurs following a disturbance to an ecosystem, such as clearing a forest for farmland.

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Secondary Succession

The changes following the Yellowstone fire were an example of secondary succession. **Secondary succession** is the series of changes that occur in an area where the ecosystem has been disturbed, but where soil and organisms still exist. Natural disturbances that have this effect include fires, hurricanes, and tornadoes. Human activities, such as farming, logging, or mining, may also disturb an ecosystem. **Unlike primary succession, secondary succession occurs in a place where an ecosystem currently exists.**

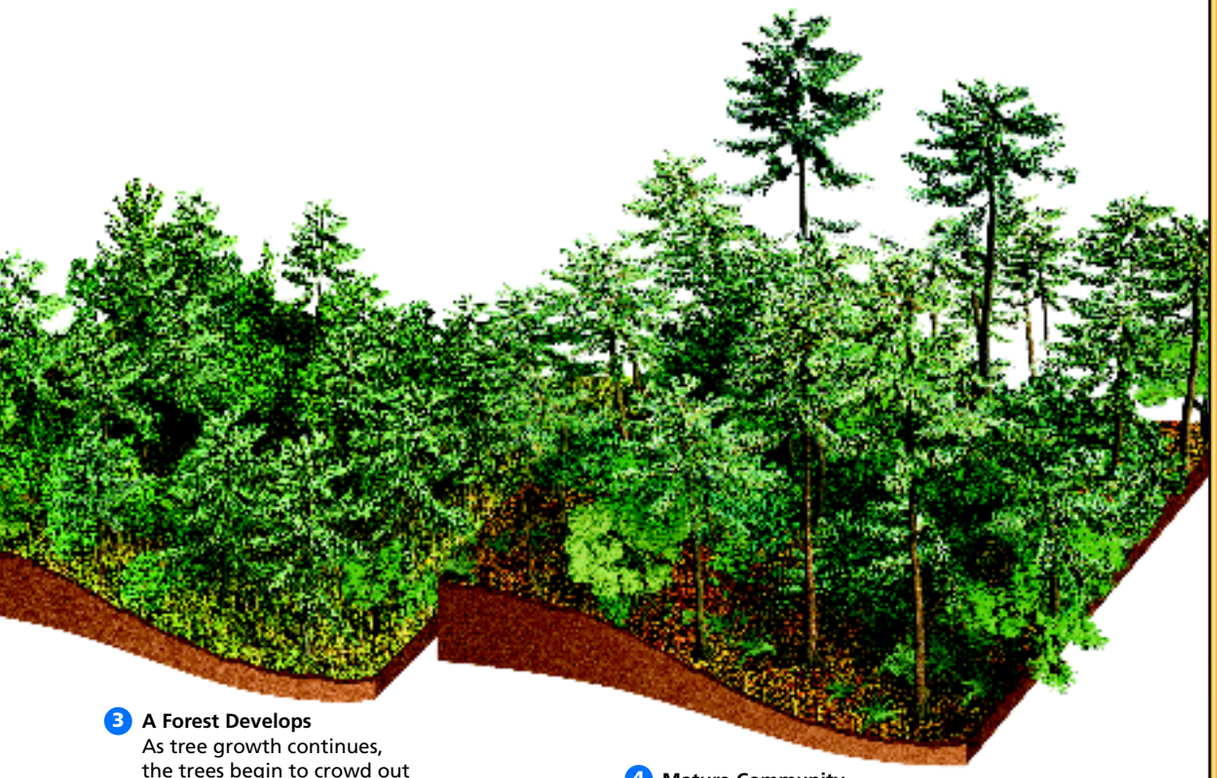
Secondary succession usually occurs more rapidly than primary succession. Consider, for example, an abandoned field in the southeastern United States. You can follow the process of succession in such a field in Figure 20. After a century, a hardwood forest is developing. This forest community may remain for a long time.

Reading Checkpoint **What are two natural events that can disturb an ecosystem?**

Differentiated Instruction

Less Proficient Readers L1
Interpreting Diagrams Ask students to compare the first picture in Figures 19 and 20. Help them see that the first picture of Figure 19 shows an area with no soil and no organisms, but in Figure 20 the first picture has plants already living there. Help them relate these differences to the definitions of the terms *primary* and *secondary succession*. **learning modality: visual**

Gifted and Talented L3
Researching Succession Encourage students to research examples of succession (a vacant lot, an old farm field). Have them choose a location and find photos of the area, showing how it has changed. Tell students to use the photos to create a timeline that describes the changes in their location over time. **learning modality: logical/mathematical**



3 A Forest Develops
As tree growth continues, the trees begin to crowd out the grasses and wildflowers.

4 Mature Community
Eventually, a mixed forest of pine, oak, and hickory dominates the landscape.

Section 4 Assessment

Target Reading Skill **Comparing and Contrasting** Use the information in your table to help you answer Question 1 below.

Reviewing Key Concepts

1. a. **Defining** What is primary succession? What is secondary succession?

b. **Comparing and Contrasting** How do primary succession and secondary succession differ?

c. **Classifying** Grass poking through a crack in a sidewalk is an example of succession. Is it primary succession or secondary succession? Explain.

Lab zone At-Home Activity

Community Changes Interview a family member or neighbor who has lived in your neighborhood for a long time. Ask the person to describe how the neighborhood has changed over time. Have areas that were formerly grassy been paved or developed? Have any farms, parks, or lots returned to a wild state? Write a summary of your interview. Can you classify any of the changes as examples of succession?

Monitor Progress L1

Answer

Reading Checkpoint Possible answers: Fires, hurricanes, tornadoes

Assess

Reviewing Key Concepts

1. a. Primary succession occurs in an area where no soil or organisms exist. Secondary succession occurs after a disturbance in an existing ecosystem. **b.** Secondary succession generally occurs more rapidly than primary succession. **c.** Secondary succession; before the sidewalk was built, an ecosystem existed there.

Reteach L1

Help students use Figures 19 and 20 to present the processes of primary and secondary succession.

All in One Teaching Resources

- Section Summary: *Changes in Communities*
- Review and Reinforce: *Changes in Communities*
- Enrich: *Changes in Communities*

Lab zone At-Home Activity

Community Changes L2 Suggest that students take notes so that they will remember what the person said. Have students present their summaries followed by a class discussion, focusing on any examples of succession they identified.